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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,070	12/04/2003	Hee Cheul Choi	STFD.055PA (S02-302)	7638
40581	7590	10/12/2006		
CRAWFORD MAUNU PLLC 1270 NORTHLAND DRIVE, SUITE 390 ST. PAUL, MN 55120			EXAMINER HENDRICKSON, STUART L	
			ART UNIT	PAPER NUMBER

1754

DATE MAILED: 10/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/728,070

Applicant(s)

CHOI ET AL.

Examiner

Stuart Hendrickson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25,32 and 33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-21 is/are allowed.
- 6) ☒ Claim(s) 22-25,32 and 33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. Claims 22, 25, & 32 are rejected under 35 U.S.C. 102(e) as being anticipated by Mao et al. (2003/0039750 A1), alone or taken with Serp et al.

Mao teaches making a catalyst by immersing a substrate in an aqueous solution that reduces a metal salt and deposits metal nanoparticles on the substrate (see Step 1, beginning on paragraph [0018]). Iron is taught as a catalyst and alumina (although not claimed at present, silica would also be an obvious variation of this teaching) is taught as the substrate. As clearly taught by Serp (page 3089), alumina inherently has surface hydroxyl groups. Mao subsequently uses the catalyst to grow carbon nanotubes.

Claim 32: Mao teaches a substrate that inherently contains hydroxyl molecules with iron nanoparticles deposited thereon.

2. Claims 23-24 & 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mao et al. in view of Dai et al. (2001/0019238 A1), alone or also with Serp et al.

Mao teaches a process for making a supported catalyst as described with respect to claim 22 above, but does not teach oxidizing the metal particles before nanotube growth. Dai, however, teaches oxidizing iron catalyst particles on a substrate (paragraph [0036]). It would have been obvious to one of ordinary skill in the art to oxidize the metal particles of Mao in order to produce more catalytically active oxide particles and to protect against sintering as taught by Dai (paragraph [0042]).

The product by process limitations of claim 33 are only given patentable weight to the extent that they impart distinctive structural characteristics that would not be expected of the product of the prior art (see MPEP 2113). The only process differences claimed is the use of hydroxylamine, which would not be expected to impart a substantial product difference to other reducing agents, and the oxidation of the particles, which is addressed above with respect to claims 23-24. Once a product that appears to be substantially identical is found, the burden is

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on the applicant to show an unobvious difference. Applicant arguments and expert opinions are not a substitute for factual evidence.

Claims 32-33 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Resasco et al. (6413487), alone or taken with Serp et al.

Resasco teaches a process for making carbon nanotubes that includes catalysts comprising metal nanoparticles, including iron (see claim 23), on a ceramic substrate (claim 21 & Column 7, lines 58-62) such as alumina, which inherently contains hydroxyl molecules (Serp et al.). Also taught is surface oxidized silica (Column 7, last paragraph).

The product by process limitations of claim 33 are only given patentable weight to the extent that they impart distinctive structural characteristics that would not expected of the product of the prior art (see MPEP 2113). The product that is expected to result from the claimed process limitations is iron oxide particles on a ceramic substrate that are capable of producing carbon nanotubes, which is taught by Resasco. Once a product that appears to be substantially identical is found, the burden is on the applicant to show an unobvious difference. Applicant arguments and expert opinions are not a substitute for factual evidence.

Claim 32 is rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Shiota et al 6797184.

The reference teaches in columns 9-13 and 54 (prep 3) treating active C to make OH groups, adding iron then reducing, such as with sodium borohydride. .

Claims 22, 23 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiota. Shiota does not explicitly teach that the borohydride is in the liquid, but injecting it in the liquid during the catalyst preparation is an obvious expedient to efficiently perform the desired reduction. Col. 12 middle teaches drying as meeting claim 23. Concerning the 'nanoparticles' of claim 22. these are deemed form due to the similarity to the instant methods.

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Claim 32 is rejected under 35 U.S.C. 102(b) as being anticipated by Oikawa et al. 4831011.

The reference teaches in columns 2 and 3 treating active C to form OH groups, then bonding iron thereto.

Claims 22, 23 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsao 4513098.

Tsao teaches in columns 2, 4 and 5 treating an OH containing support with an element such as Fe and reducing, then optional heating. Note that bubbling hydrogen in the solution means the solution has hydrogen present. Choosing iron is an obvious expedient from the metals disclosed; In re Boesch 205 USPQ 215. Concerning the 'nanoparticles' of claim 22. these are deemed form due to the similarity to the instant methods.

Claim 32 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Van Montfoort et al. 4111842.

The reference teaches in col. 2,3 treating active C to make functional groups, adding Group VIII element such as Fe and then reducing. The selection of iron from the list is either a direct anticipation or an obvious choice.

Claims 22, 23 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Montfoort taken with Shiota or Tsao.

Van Montfoort does not teach that the reducing agent be in solution, however Shiota does. Performing in-situ reduction in the process of Van Montfoort, rather than reduction with hydrogen, is an obvious expedient to perform the desired reduction in a relatively safe and efficient manner. Alternately, Tsao teaches hydrogen reduction at a low temperature, using this instead of the reduction of Van Montfoort is an obvious expedient to perform the reduction efficiently without extra steps and apparatus. Concerning the 'nanoparticles' of claim 22. these are deemed form due to the similarity to the instant methods.

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Applicant's arguments filed 7/10/06 have been fully considered but they are not persuasive.

The alumina in Mao is a substrate because something is put onto it. The claim language is not sufficient to require an actual deliberate step of oxidation of the substrate to form the OH groups as part of the process; their presence is evidence that this has occurred. The unheated alumina of Mao has the groups. The argument concerning claim 33 is not persuasive, as no unexpected results are claimed or demonstrated. The structure appears to be the same. Concerning Serp, the document can be found in the application file ('public PAIR'). In any event, additional references have been cited to firmly establish this proposition.

There should be no doubt, from the references of record, that carbon, silica and alumina are expected to contain surface OH groups. Because they contain them, at some point they were 'formed'. They are deemed functional equivalents as supports for iron-containing catalysts and sorbents.

Any inquiry concerning this communication should be directed to examiner Hendrickson at telephone number (571) 272-1351.

A handwritten signature in black ink, appearing to read 'Stuart Hendrickson' with a stylized flourish at the end.

Stuart Hendrickson
examiner Art Unit 1754